

REMARKS

Claims 1-10 are pending in the application. New claims 11-17 have been added.

Reconsideration of claims 1-17 is respectfully requested.

Rejection under 35 USC 102(b)

Claims 1-6 stand rejected under 35 U.S.C. 102(b) as being anticipated by WO '502 cited by the Examiner. This rejection is respectfully traversed.

First, for clarity it may be helpful to enumerate various compositions of claim 1, comprising Zn atomized powder for alkaline batteries with 0-0.5% Pb:

claim 1(a): (1) 0.005-2% In, 0.005-2% Al
(2) 0.005-2% In, 0.005-2% Bi

claim 1 (b) (3) 0.005-2% In, 0.005-2% Bi, 0.001-0.5% Al
(4) 0.005-2% In, 0.005-2% Bi, 0.001-0.5% Ca
(5) 0.005-2% In, 0.005-2% Bi, 0.001-0.5% Al, 0.001-0.5% Ca

claim 1(c): (6) 0.005-2% Bi
(7) 0.005-2% Al
(8) 0.005-2% Bi, 0.005-2% Al.

Citing W094/19502 as a reference, the Examiner asserts that all of the compositions listed above are anticipated by said '502 reference. The applicant respectfully submits that there is no disclosure of any kind in said reference that anticipates compositions (2), (4), (6) and (7) listed above. Section 102(b) requires that the same or similar composition be described in the cited reference. This not being the case, Section 102(b) is inapplicable to these embodiments of the claimed composition (as to compositions 1,3,5, and 8 see *vide infra*).

In addition, in order to show distinctive differences between the products obtained by centrifugal atomization of zinc alloy powders in normal versus a protective (low oxygen) atmosphere, the applicant herewith submits the results of a study described in Table 2 in the Declaration attached hereto and made a part hereof.

It may be noteworthy at this point to indicate that centrifugal atomization under low oxygen atmosphere yields powders with a closely controlled particle size and shape distribution, thereby making it possible to control the surface area and apparent density of the powder. Also, the gassing is less, because the particle surface is smoother. Furthermore, centrifugal atomization causes less thermal shock in each particle upon formation thereby reducing induced thermal strain, which increases corrosion.

Now, as to the other claimed embodiments of the composition (i.e., 1,3,5 and 8), referring to the data presented in the Declaration under Table 2 (which corresponds to Table 2 in the specification), please note the contrast as follows:

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Example (25) versus (27) illustrates the effect of low oxygen for composition (3);

- (26) versus (28) for composition (2),
- (29) versus (30) for composition (1),
- (31) versus (32) for composition (4),
- (33) versus (34) for composition (5), and
- (35) versus (36) illustrates for composition (8).

As shown by the data in Table 2 of the Declaration, the significant differences obtained in volume expansion are indeed quite remarkable. These results, therefore, clearly demonstrate the distinctive differences between the product obtained by centrifugal atomization under protective atmosphere in accordance with the present invention compared to the conditions disclosed by the cited reference (WO '502, **which does not utilize protective atmosphere**).

In light of the above, the rejection of claim 1 under 35 USC 102(b) is inapplicable and this rejection should now be withdrawn.

Rejection under 35 USC 103(a)

Claims 1-10 stand rejected under 35 USC 103(a) over WO'502 in combination with JP1-52379. This rejection is respectfully traversed.

In rejecting the claims, the Examiner notes that **"WO '502 does not expressly teach that the centrifugal atomization process is carried out in an atmosphere with a relatively low (i.e., <4vol%) oxygen content,"** (page 4 last para of the Office action). To cure this deficiency of the primary reference (WO '502), the Examiner then refers to the secondary reference, JP '379, which uses atomization under low oxygen concentration, asserting that the invention as a whole would have been obvious to one of ordinary skill in the art because the disclosure of JP '379 would motivate the artisan to conduct the centrifugal atomization of WO '502 in an atmosphere containing less than 4 vol% oxygen.

The applicant respectfully notes that a skilled artisan first of all will **not** apply the teaching and methodology of JP'379 to the process of WO '502, and if he does, that he will arrive at the same products claimed in the instant invention. The reason is two-fold:

First, the skilled person is starting from a method for manufacturing non-amalgamated powders, and will not be motivated to look into a method for the production of amalgamated powders. Indeed JP '379 teaches that whatever method is used, some Hg remains unavoidable. It needs no elaborate explanation that for serious environmental and health hazards the

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skilled artisan will not be motivated to combine WO'502 and JP'379, wherein mercury remains as a residue.

Secondly, even if the skilled person looks to JP '379, he is taught that a low gassing powder can be manufactured by adding an amount of one or more of lead, cadmium and gallium, one or more of aluminum, alkali metal, alkali-earth metal, and nickel, with gas atomizing in a low oxygen concentration atmosphere, followed by amalgamation with mercury or a mercury compound. The simple fact is that a combination of the two teachings of WO'502 and JP'379 leads to the production of very complicated mercurized alloy if the specific process of JP '379 is employed. Consequently, the artisan will not arrive at the composition of claim 1 because he has no reason to select only one or only some of the process features of JP'379. It is only a hindsight to suggest that one would select only the feature of 0-4% oxygen at the exclusion of all other associated requirements of JP'379 for the production of zinc alloy powders disclosed in WO'502 and arrive in a 'forced' manner at the compositions of claim 1 or any other claim.

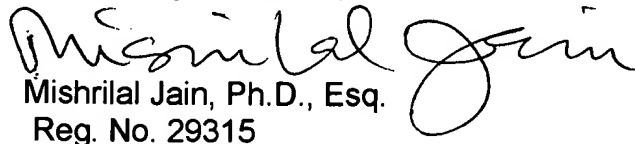
As to the Examiner's remarks referring to the abstract of JP'379 that the purpose of the low oxygen atmosphere is "to retard hydrogen gas evolution in spite of a low mercury content", it may be noted that the last sentence in the abstract specifies that it is by 'using this amalgamated zinc alloy powder' that said purpose is achieved. Of course, the term 'using...' includes more than applying not only the low oxygen atmosphere (in traditional gas atomization, not centrifugal atomization), but also 'using' the special Zn alloy composition including nickel and hazardous mercury.

In summary, for the stated reasons, the rejection of the claims under Section 103(a) is untenable and this rejection should now be withdrawn.

In light of the above the claims are believed to be in condition for allowance and favorable action accordingly is earnestly solicited. Should there still remain any outstanding issues, a phone call from the Examiner shall be much appreciated to discuss the same toward furthering the application for allowance.

A clean copy of the claims is provided herewith.

Respectfully submitted,


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Clean Copy of the Claims

1. A centrifugal atomized zinc alloy powder for alkaline batteries consisting of either of
 - (a) 0.005-2 % by weight of indium, and 0.005-0.2 % by weight of either one of Al and Bi, or
 - (b) 0.005-2 % by weight of indium, and 0.005-0.2 % by weight of Bi, and 0.001-0.5 % of either one or both of Al and Ca, or
 - (c) 0.005-2 % by weight of either one or both of Bi and Al, and 0-0.5 % by weight of Pb, the remainder being zinc, and characterized in that the centrifugal atomising process is performed in a protective atmosphere, where the oxygen content is less than 4% by volume.
2. A centrifugal atomized zinc alloy powder according to claim 1, consisting of either of:
 - (a) 0.01-2 % by weight of indium, and 0.01-0.2 % by weight of either one of Al and Bi, or
 - (b) 0.005-2 % by weight of indium, and 0.01-0.2 % by weight of Bi, and 0.003-0.5 % of either one or both of Al and Ca, or
 - (c) 0.01-2 % by weight of either one or both of Bi and Al, and 0-0.5 % by weight of Pb, the remainder being zinc.
3. A centrifugal atomized zinc alloy powder in alkaline batteries according to claim 2, characterized in that the oxygen content in the protective atmosphere is greater than 0 % by volume.
4. A centrifugal atomized zinc alloy powder in alkaline batteries according to claim 3, characterized in that the oxygen content in the protective atmosphere is between 0.2 % and 3.5% by volume.
5. An alkaline battery consisting of an anode, a cathode and an electrolyte, characterized in that the battery uses a centrifugal atomized zinc alloy powder according to claim 1.
6. An alkaline battery according to claim 5, characterized in that the powder comprises metal cemented out of the electrolyte.

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7. A process for the manufacturing of a zinc alloy powder for alkaline batteries , comprising the step of centrifugally atomising a zinc alloy consisting either of
 - (a) 0.005-2 % by weight of indium, and 0.005-0.2 % by weight of either one of Al and Bi, or
 - (b) 0.005-2 % by weight of indium, and 0.005-0.2 % by weight of Bi, and 0.001-0.5 % of either one or both of Al and Ca, or
 - (c) 0.005-2 % by weight of either one or both of Bi and Al, and 0-0.5 % by weight of Pb, the remainder being zinc, characterized in that the centrifugal atomising process is performed in a protective atmosphere, where the oxygen content is less than 4% by volume.
8. A process for the manufacturing of a zinc alloy powder for alkaline batteries , comprising the step of centrifugally atomising a zinc alloy consisting either of
 - (a) 0.01-2 % by weight of indium, and 0.01-0.2 % by weight of either one of Al and Bi, or
 - (b) 0.005-2 % by weight of indium, and 0.01-0.2 % by weight of Bi, and 0.003-0.5 % of either one or both of Al and Ca, or
 - (c) 0.01-2 % by weight of either one or both of Bi and Al, and 0-0.5 % by weight of Pb, the remainder being zinc, characterized in that the centrifugal atomising process is performed in a protective atmosphere, where the oxygen content is less than 4% by volume.
9. A process according to claim 7, characterized in that the oxygen content in the protective atmosphere is greater than 0 % by volume.
10. A process according to claim 9, characterized in that the oxygen content in the protective atmosphere is between 0.2 % and 3.5% by volume.
11. A centrifugal atomized zinc alloy powder in alkaline batteries according to claim 1, characterized in that the oxygen content in the protective atmosphere is greater than 0 % by volume.

12. An alkaline battery consisting of an anode, a cathode and an electrolyte, characterized in that the battery uses a centrifugal atomized zinc alloy powder according to claim 2.
13. An alkaline battery consisting of an anode, a cathode and an electrolyte, characterized in that the battery uses a centrifugal atomized zinc alloy powder according to claim 3.
14. An alkaline battery consisting of an anode, a cathode and an electrolyte, characterized in that the battery uses a centrifugal atomized zinc alloy powder according to claim 4.
15. A process according to claim 8, characterized in that the oxygen content in the protective atmosphere is greater than 0 % by volume.
16. A process according to claim 7, characterized in that the oxygen content in the protective atmosphere is between 0.2 % and 3.5% by volume.
17. A process according to claim 8 characterized in that the oxygen content in the protective atmosphere is between 0.2 % and 3.5% by volume.